

Opportunity Cost and Comparative Advantage

People who don't know much about economics often dismiss economics as being little more than cost / benefit analysis. While it is true that this is a very important concept, economics is not that simple. In fact, one of the most difficult things in economics is understanding the opportunity cost of choosing a particular action.

We have seen that economic entities such as countries often face *increasing* opportunity costs as they try to increase production. For instance, when a country finds itself at war and needs to increase its production of armaments, at first it finds that increasing military production comes at a relatively low opportunity cost, as the first factories converted to military use are generally well-suited for such an event.

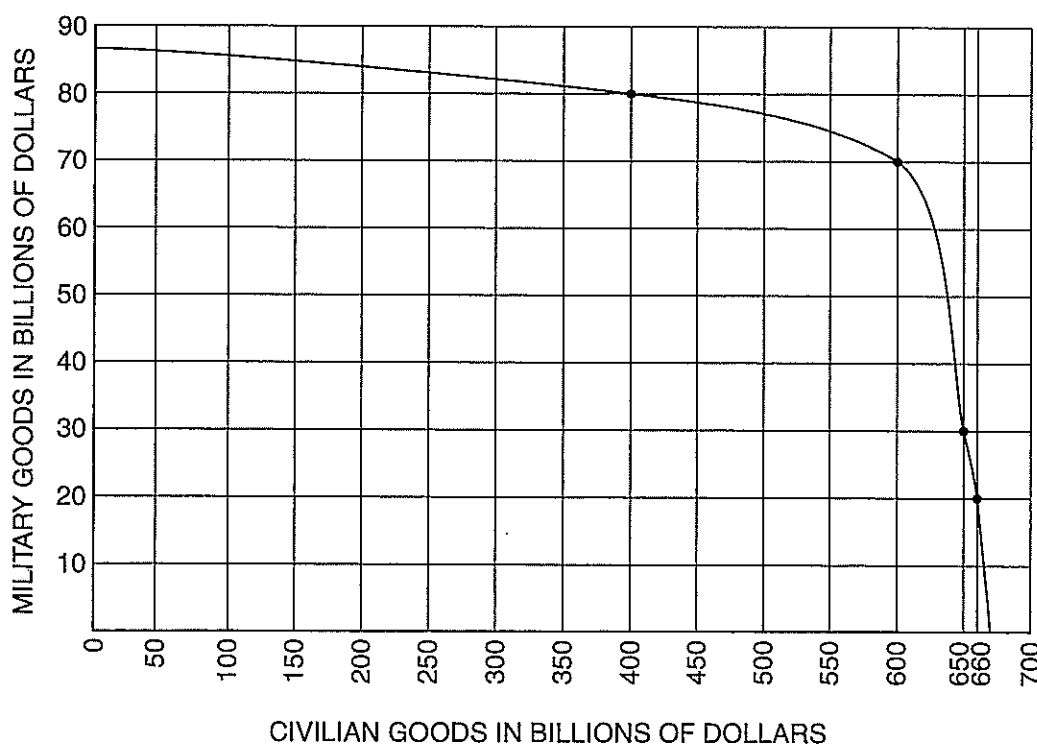
As the war goes on, however, we see factories that are not at all well-suited to producing weapons being converted to military service, at a very high opportunity cost. Little is added to the output of armaments, and a great deal is sacrificed in terms of consumer goods.

The notion of increasing opportunity costs is manifested in a production possibilities curve that is concave towards the origin. In Figure 6.1, we can see that as we increase the production of military goods, each additional unit of output costs more in terms of civilian goods. When the government initially



Figure 6.1

Production Possibilities Curve: Military and Civilian Goods



Activity written by Ike Brannon, Joint Economic Committee, U.S. Senate, Washington, D.C.

increases the output of military goods from \$20 billion to \$30 billion, the opportunity cost (in terms of civilian goods forgone) is small: only \$10 billion of military goods (\$660 billion minus \$650 billion).

However, when the country is already producing a lot of military goods and wants to produce even more, the cost is much higher. If the country is producing \$70 billion and wants to produce \$80 billion, the opportunity cost is now \$200 billion, or \$600 billion minus \$400 billion.

Opportunity cost also explains the incredible amount of trade that goes on among individuals, firms and countries. Today, of course, few of us produce our own goods and services; we rely on others to do this while we use our time earning money at a job. Instead of making our goods, we buy them. Computer manufacturers actually produce few of their own parts, but instead buy parts from suppliers.

Countries tend to specialize in the production of goods and services as well; for instance, there aren't any firms in the United States currently making television sets, and we make very few consumer electronics of any sort. Instead, our businesses concentrate on making other goods and services, and we import the televisions we need.

As we will see, we benefit from trade with other countries even if we are better at producing *everything* than the other country. Trade will benefit both countries as long as we each specialize in doing the task for which we have a lower opportunity cost. This is called *comparative advantage*.

Part A: Examples

Let's begin with a simple example. One summer two friends, Ty and Jessica, each started a business, making money by providing lawn-care services. Although they earned decent money working alone, they wondered if they could make more money by working together. The table below shows how many minutes it takes for each to complete the two tasks involved in doing one lawn: mowing and trimming, which includes the sweeping, edging and cleanup.

	Mow	Trim
Ty	60 minutes	40 minutes
Jessica	75 minutes	90 minutes

Someone who can do an activity using fewer resources is said to have an *absolute advantage*. Ty has an absolute advantage at both activities. Does this mean he should continue working alone?

If your instinct is to say that Ty should not partner with Jessica, you are wrong, but you are in good company: Adam Smith, whom many regard as the founder of modern economics, thought the same thing. It wasn't until David Ricardo came along in the early 1800s that people realized specialization and trade *can* benefit everyone *even if one of the parties has an absolute advantage at both activities!*

If Ty and Jessica are going to specialize, who should do what? Now, absolute advantage does not tell us anything, since Ty is better at both things. Instead, we have to look at *comparative advantage*.

We say someone has a comparative advantage at a task if this person can do the task at a *lower opportunity cost* than the other person.

Here, the opportunity cost of Ty mowing a lawn is how much of a lawn he could have trimmed in the same time. In this case, Ty could have used the 60 minutes it takes him to mow one lawn and he could have trimmed $1\frac{1}{2}$ lawns, or $\frac{3}{2}$ lawns.

For Jessica, the opportunity cost of mowing one lawn is what she could have trimmed during the 75 minutes she needed to mow that lawn. Jessica could have trimmed only $\frac{5}{6}$ (or $\frac{75}{90}$) of a lawn. Thus, we can see that Jessica has a comparative advantage in mowing lawns because Jessica's opportunity cost of mowing a lawn is lower than Ty's. Five-sixths of a lawn trimmed is less than $\frac{3}{2}$ lawns trimmed.

Now, we can calculate their opportunity cost to *trim* lawns. It takes Ty 40 minutes to trim one lawn, and with these 40 minutes he could instead have mowed $\frac{2}{3}$ of a lawn (or $\frac{40}{60}$). For Jessica, instead of using 90 minutes to trim one lawn, she could have spent these 90 minutes mowing one lawn and $\frac{1}{5}$ of another lawn ($\frac{90}{75}$). Thus, Ty has a comparative advantage in trimming lawns. The table below shows the relative opportunity costs.

	Opportunity cost of mowing one lawn	Opportunity cost of trimming one lawn
Ty	$\frac{3}{2}$ lawn trimmed	$\frac{2}{3}$ lawn mowed
Jessica	$\frac{5}{6}$ lawn trimmed	$\frac{6}{5}$ lawn mowed

Notice two things about our calculation of opportunity cost: First, Ty's opportunity cost of mowing one lawn ($\frac{3}{2}$ lawns trimmed) is the reciprocal of his opportunity cost of trimming one lawn ($\frac{2}{3}$). This will always be true, so in this example we did twice as much math as we would normally have to.

Second, notice that each person has a comparative advantage in precisely one activity. Unless a person is equally able at both activities, this will always be true as well.

Next, let's see whether this specialization actually increases their productivity. Before specializing, it would take Jessica 165 minutes ($90 + 75$) to mow and trim one lawn and Ty 100 minutes ($60 + 40$) to mow and trim one lawn, for a total of 265 minutes. If Jessica mows two lawns and Ty trims two lawns, then the total time needed to do two lawns would be 150 (75×2) + 80 (40×2) minutes or 230 minutes.

Thus, they save 35 minutes, or 13 percent of the total time necessary to do the lawns without specializing. Together, they can do more lawns in a week, and they can split the additional income so both are richer.

Let's look at one more example. Here, we will express the relative productivity of each person not in the number of minutes they need to do the activity but instead in *how many activities they can do in an hour*.

A few years ago Mark and Doreen were earning extra money installing car stereos for a local electronics store when they decided to go into business for themselves. After they rented a garage, they had to decide who should do what activity. The table below describes their productivity in the number of stereos and speakers installed per hour.

	Mark	Doreen
Radios installed	6	10
Speakers installed	2	5

The table below contains the breakdown of the opportunity cost for each person to do each activity.

	Mark	Doreen
Installing 1 radio	$\frac{1}{3}$ speaker	$\frac{1}{2}$ speaker
Installing 1 speaker	3 radios	2 radios

Mark has the comparative advantage in installing radios, and Doreen has the comparative advantage in installing speakers. By specializing, their total output increases.

Part B: Questions

1. What is the difference between comparative advantage and absolute advantage?
2. You're given the following information about a newlywed couple and the time it takes each of them to do two different chores: vacuuming a room or washing a load of dishes.

	Mike	Debbie
Vacuum a room	60 minutes	45 minutes
Wash a load of dishes	30 minutes	45 minutes

- (A) What is Mike's opportunity cost of vacuuming in terms of washing dishes?
- (B) What is Mike's opportunity cost of washing dishes in terms of vacuuming?
- (C) What is Debbie's opportunity cost of vacuuming in terms of washing dishes?
- (D) What is Debbie's opportunity cost of washing dishes in terms of vacuuming?
- (E) Who has the *absolute* advantage in vacuuming? _____
- (F) Who has the *absolute* advantage in washing dishes? _____
- (G) Who has the *comparative* advantage in vacuuming? _____
- (H) Who has the *comparative* advantage in washing dishes? _____
- (I) Who should do which chore and why? Base your answer only on the information above and on comparative-advantage considerations.

3. Now, you're given the following information about Andy and Hannah and the time it takes each of them to clean an office and clean a jail cell:

	Andy	Hannah
Cleaning offices	60 minutes	20 minutes
Cleaning jail cells	30 minutes	15 minutes

- (A) What is Andy's opportunity cost of cleaning offices in terms of cleaning jail cells?
- (B) What is Hannah's opportunity cost of cleaning offices in terms of cleaning jail cells?
- (C) What is Andy's opportunity cost of cleaning jail cells in terms of cleaning offices?
- (D) What is Hannah's opportunity cost of cleaning jail cells in terms of cleaning offices?
- (E) Who has the *absolute* advantage in cleaning offices? _____
- (F) Who has the *absolute* advantage in cleaning jail cells? _____
- (G) Who has the *comparative* advantage in cleaning offices? _____
- (H) Who has the *comparative* advantage in cleaning jail cells? _____
- (I) Who should do which chore and why? Base your answer only on the information above and on comparative-advantage considerations.

4. Consider the following two countries. Assume they produce only these two goods. *Note that productivity is now measured in how many goods can be produced per hour, the opposite of how we measured it in Questions 2 and 3.*

	United States	Japan
Cars	12	10
Computers	4	6

- (A) What is the United States' opportunity cost of making cars?